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ORIGINAL

FLOOD INSURANCE STUDY

BOROUGH OF ROUSEVILLE, PENNSYLVANIA
VENANGO COUNTY

MAY 19, 1987

Federal Emergency Management Agency

COMMUNITY NUMBER - 420839

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NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY
BOROUGH OF ROUSEVILLE, VENANGO COUNTY, PENNSYLVANIA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Borough of Rouseville, Venango County, Pennsylvania, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound flood plain management. Minimum flood plain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by the U. S. Army Corps of Engineers (COE), Pittsburgh District, for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-E-1153, Project Order No. 1, Amendment No. 20. This work was completed in September 1985.

1.3 Coordination

On July 27, 1983, an initial Consultation and Coordination Officer's (CCO) meeting was held with representatives from FEMA, the borough, and the Pittsburgh District of the COE (the study contractor) to determine the streams to be studied by detailed methods. Coordination of this study involved Notice of Initiation letters, public meetings, and incidental meetings with borough officials. Notice of Initiation of Study letters dated December 1, 1983, announced the start of the study and were sent to all Federal, state, county, and local government agencies and private firms that could possibly make input to the study.

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On June 25, 1986, a final CCO meeting was held with representa- tives from FEMA, the borough, and the study contractor to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Borough of Rouseville, Venango County, Pennsylvania. The area of study is shown on the Vicinity Map (Figure 1).

Oil Creek and Cherry Run were studied in detail for their entire lengths within the community. A shallow flooding area approximately 250 feet south of the intersection of Short Street and Pisgan Street, extending along CONRAIL to the corporate limits at Cornplanter was also studied by detailed methods. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction through September 1990.

2.2 Community Description

The Borough of Rouseville is located in northeastern Venango County in northwestern Pennsylvania, approximately 1.5 miles north of Oil City. The total land area contained within Rouseville is 0.9 square mile. The borough is surrounded by the Township of Cornplanter. According to the U. S. Bureau of Census, the population of Rouseville was 734 in 1980, a 16.3 percent decrease from the 1970 population of 877 (Reference 1).

Oil Creek, with a total drainage area of 313 square miles, has its source in northeastern Crawford County in northwestern Pennsylvania. It flows in a generally southeastern direction through Crawford and Venango Counties for a distance of approximately 42 miles where it meets the Allegheny River in Oil City, Pennsylvania. The average bed slope of Oil Creek within the study area is 11 feet per mile. Development within the flood plain of Oil Creek in Rouseville is industrial.

Cherry Run, with a drainage area of 12.8 square miles at its mouth, has its source near East Shamburg, Pennsylvania, in northeastern Venango County. The stream flows in a southwestern direction to Rouseville where it joins Oil Creek, a distance of 10 miles. The average slope of Cherry Run in the study reach is 60 feet per mile. Local relief varies from a low of 995 feet to an average hilltop elevation of 1,550 feet. Development in the flood plain of Cherry Run is industrial near its confluence with Oil Creek and residential in the upper reach.

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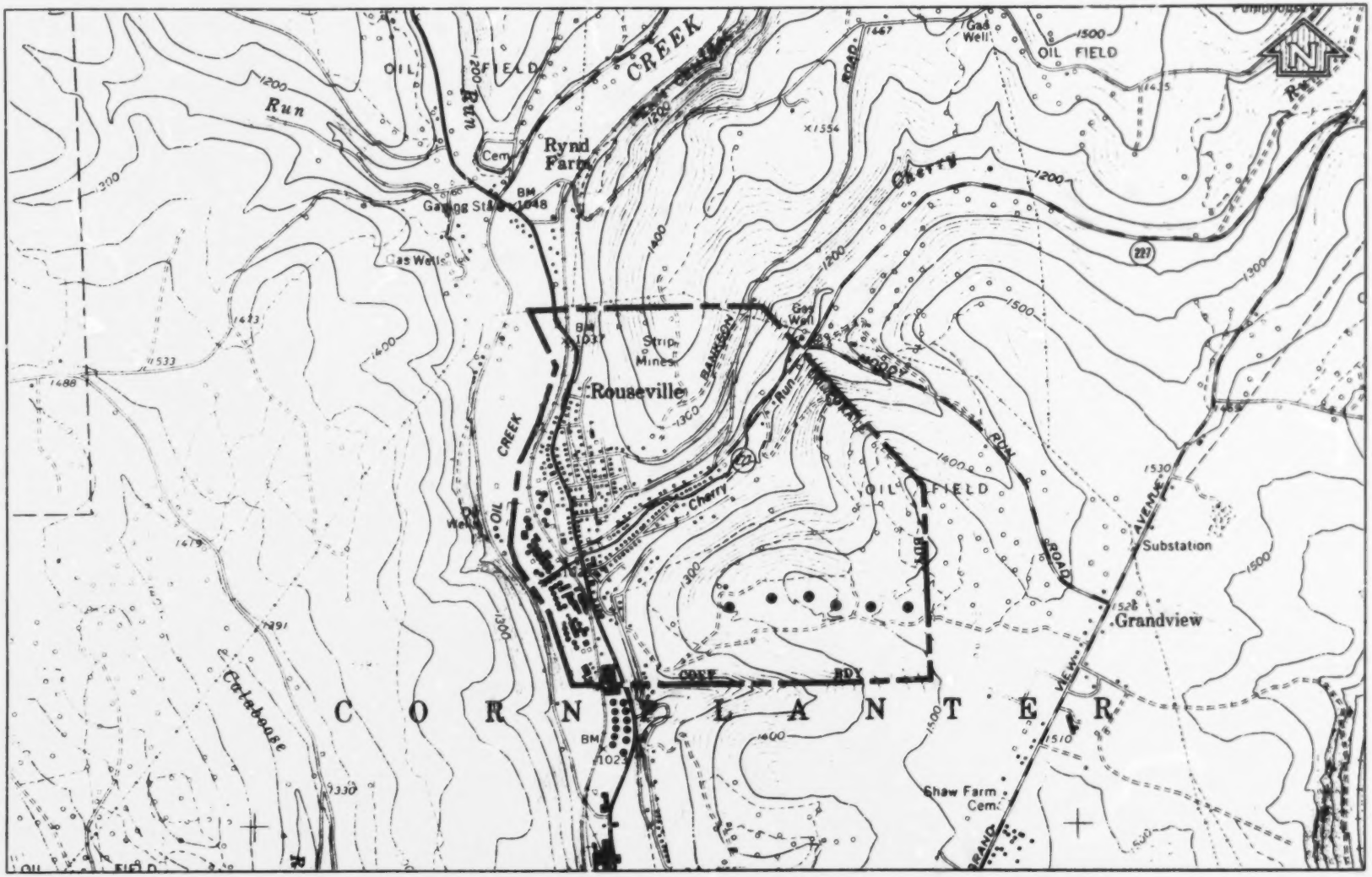

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF ROUSEVILLE, PA
(VENANGO CO.)

APPROXIMATE SCALE
2000 0 2000 4000 8000 FEET

VICINITY MAP

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The climate for this area is temperate with seasonal variation in temperature. Rouseville is geographically located in a region of both polar and tropical air mass activity, subjected to continental and maritime invasion. The weather is usually moderate but may have occasional rapid changes resulting from frontal air mass movements. Temperatures range from an average of 27 degrees Fahrenheit (°F) in February to an average of 71°F in July. Measurable precipitation occurs an average of 150 days a year and amounts to an annual average of 40 inches.

2.3 Principal Flood Problems

Major floods have occurred on Oil Creek at various times of the year. However, the main flood season is usually December through April. Most of the floods during this period are the result of heavy rain and snowmelt. These winter floods may be worsened by ice jams that occur on Oil Creek. Ice jams can cause unpredictable rises in creek stages with abnormally high stages along the stream. The maximum flood of record occurred in January 1959 and was the result of snowmelt and heavy rain. The following tabulation shows major floods on Oil Creek measured at the U. S. Geological Survey (USGS) gaging station at Rouseville, Pennsylvania.

Date of Crest	Stage (feet)	Elevation (feet)	Discharge (cfs)
January 22, 1959	11.97	1,040.30	21,000
October 16, 1954	11.55	1,039.88	18,800
March 5, 1964	11.59	1,039.92	18,500
March 22, 1948	11.29	1,039.62	16,800
May 28, 1946	11.20	1,034.53	16,300
February 17, 1976	10.94	1,039.27	15,000
July 8, 1977	10.34	1,038.67	12,400
June 23, 1972	10.25	1,038.58	12,000

Note: Gage Zero Elevation = 1,028.32 feet

No historical flood data are available for Cherry Run. This stream is more susceptible to flash flooding from intense, short duration summer storms. The most recent flood to have occurred on Cherry Run took place in June 1981.

2.4 Flood Protection Measures

At present, there are no flood protection projects on Oil Creek and Cherry Run that would affect flooding in the Borough of Rouseville, and there are no plans for such structures in the foreseeable future.

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3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting the community.

Natural discharge-frequency curves on Oil Creek were developed following the standard log-Pearson Type III analysis as outlined in USGS Bulletin 17B (Reference 2). The stage discharge records used in the analysis of Oil Creek, covering a 52-year period, were obtained from the USGS gaging station located in Rouseville.

There are no gage or stream flow records available for Cherry Run. Flows for the 10-, 50-, 100-, and 500-year frequency floods were developed using multiple regression formulas developed by the COE (Reference 3). The formulas relate discharge to drainage area, channel slope, and watershed shape, and were developed from an analysis of natural flow frequencies from gaged watersheds.

A summary of drainage area-peak discharge relationships for the streams studied by detailed methods are shown in Table 1, "Summary of Discharges."

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TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
OIL CREEK					
At downstream corporate limits	300	13,800	20,100	23,300	31,800
At confluence of Cherry Run	287	13,800	20,000	22,700	30,400
CHERRY RUN					
At confluence with Oil Creek	12.8	1,460	2,480	3,040	4,640

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross-section data for the backwater analyses were obtained from topographic maps compiled from aerial photographs at a scale of 1:4,800 with a contour interval of 4 feet (Reference 4). All bridges and culverts were field surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the Flood Insurance Rate Map (Exhibit 2).

Water-surface elevations of floods of the selected recurrence intervals were computed using the COE HEC-2 step-backwater computer program (Reference 5). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. Starting water-surface elevations for Oil Creek were obtained from a continuation of profiles developed for Flood Insurance Studies for the Township of Cornplanter and the City of Oil City (References 6 and 7). Starting water-surface elevations for Cherry Run were started at critical depth.

Channel and overbank roughness factors (Manning's "n") used in the hydraulic computations were chosen on the basis of field inspection and verification of the roughness requirement to reproduce profiles for known floods for which high-water marks were obtained and flow quantities were measured or easily calculated. For Oil Creek, the stage-discharge rating curve for the recording gage located on the State Route 8 bridge

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was reproduced successfully using the roughness coefficients. The channel "n" value for Oil Creek was 0.038, and the overbank "n" value was 0.070. Since there are no known flood records for Cherry Run, the roughness coefficients had to be estimated by observing the characteristics of its channel. The channel "n" values for Cherry Run ranged from 0.020 to 0.045, and the overbank "n" values ranged from 0.030 to 0.100.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps; the descriptions of the marks are presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year flood plain boundaries and 100-year floodway to assist communities in developing flood plain management measures.

4.1 Flood Plain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for flood plain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the streams studied in detail, the 100- and 500-year flood plain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:4,800 with a contour interval of 4 feet (Reference 4). The boundaries of the shallow flooding area were also delineated using these topographic maps (Reference 4).

The 100- and 500-year flood plain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year flood plain boundary corresponds to the boundary of the areas of special flood hazards (Zone AE), and the 500-year flood plain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year flood plain boundaries are close together, only the 100-year flood plain boundary has been shown. Small areas within the flood plain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

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4.2 Floodways

Encroachment on flood plains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood plain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the flood plain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 2). The computed floodways are shown on the Flood Insurance Rate Map (Exhibit 2). In cases where the floodway and 100-year flood plain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway widths for Oil Creek extend beyond the corporate limits.

The area between the floodway and 100-year flood plain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Oil Creek								
A	17,454[1]	251[3]	2,925	7.8	1,031.2	1,031.2	1,031.5	0.3
B	20,274[1]	630[3]	4,368	5.2	1,035.1	1,035.1	1,035.7	0.6
Cherry Run								
A	800[2]	136	620	4.9	1,036.6	1,036.6	1,037.6	1.0
B	3,165[2]	89	438	6.9	1,061.6	1,061.6	1,062.1	0.5
C	5,020[2]	51	301	10.1	1,085.3	1,085.3	1,086.3	1.0

[1]Feet above confluence with Allegheny River
[2]Feet above confluence with Oil Creek
[3]This width extends beyond corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF ROUSEVILLE, PA
(VENANGO CO.)

FLOODWAY DATA

OIL CREEK - CHERRY RUN

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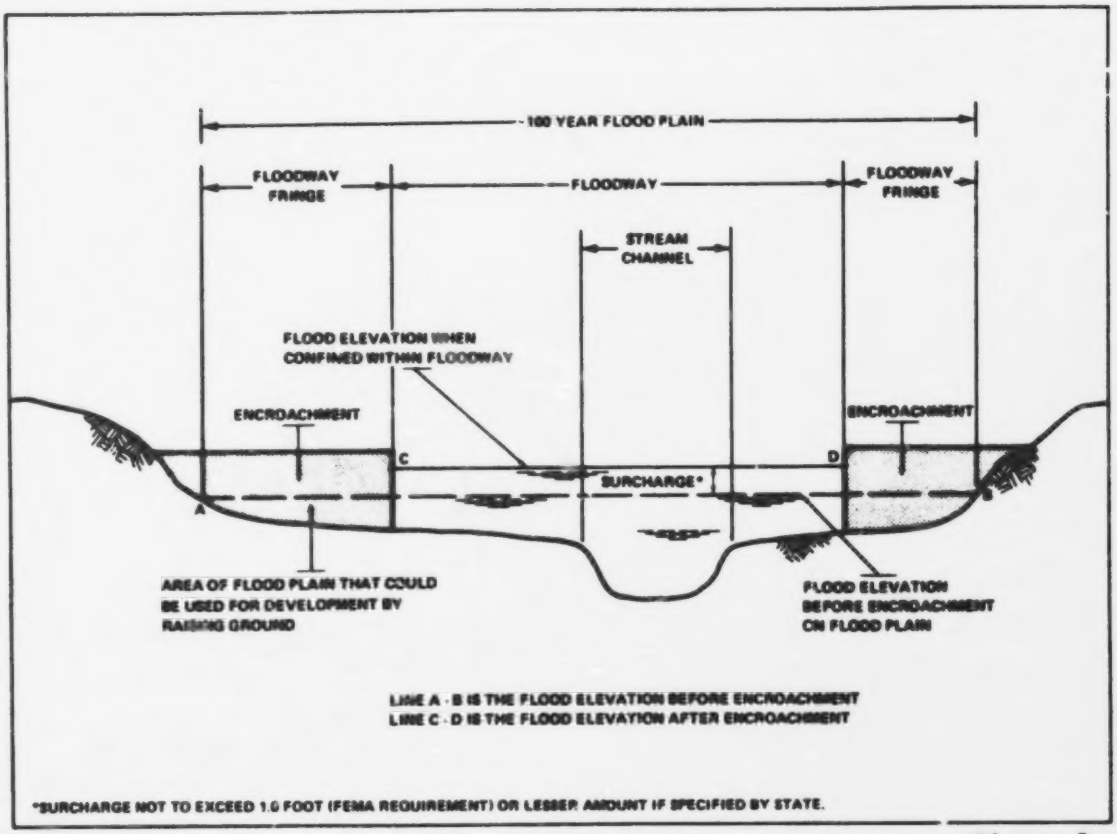
100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FLOODWAY SCHEMATIC

Figure 2

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year flood plains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year flood plains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

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Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year flood plain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal flood plains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal flood plains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year flood plain, areas within the 500-year flood plain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square milesponds to areas outside the 500-year flood plain, areas within the 500-year flood plain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

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Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and flood plain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year flood plains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For flood plain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year flood plains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

7.0 OTHER STUDIES

A Flood Insurance Study for the Township of Cornplanter is currently being prepared (Reference 6). The results of that study will be in exact agreement with the results of this study.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, Liberty Square Building (Second Floor), 105 South Seventh Street, Philadelphia, Pennsylvania 19106.

9.0 BIBLIOGRAPHY AND REFERENCES

1. U. S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Pennsylvania, Washington, D. C., U. S. Government Printing Office, 1981.

2. U. S. Department of the Interior, Geological Survey, Office of Water Data Collection, Interagency Advisory Committee on Water Data, "Guidelines for Determining Flood Flow Frequency," Bulletin 17B, Reston, Virginia, Revised September 1981.

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3. U. S. Army Corps of Engineers, Pittsburgh District, "Untitled Regression Data," Pittsburgh, Pennsylvania, 1975.

4. Michael Baker, Jr., Inc., of Beaver, Pennsylvania, Topographic Maps compiled from aerial photographs, Scale 1:4,800, Contour Interval 4 Feet: Rouseville, Pennsylvania, taken in February 1984,

5. U. S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Generalized Computer Program, Davis, California, October 1973.

6. Federal Emergency Management Agency, Flood Insurance Study, Township of Cornplanter, Venango County, Pennsylvania (Unpublished).

7. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, City of Oil City, Venango County, Pennsylvania, Washington, D. C., July 5, 1977.

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EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	Elevation (Feet NGVD)	Description of Location
RM 1	1,037.14	Standard disk in top of south end of west concrete pier foundation of CONRAIL bridge over State Route 8.
RM 2	1,034.59	Top of bolt in cut square on upstream north abutment of CONRAIL bridge over Cherry Run.
RM 3	1,033.54	Cut L in upstream south pier of State Route 8 bridge over Cherry Run.
RM 4	1,076.11	Cut square in top of downstream concrete railing of State Route 227 bridge over centerline of Cherry Run.

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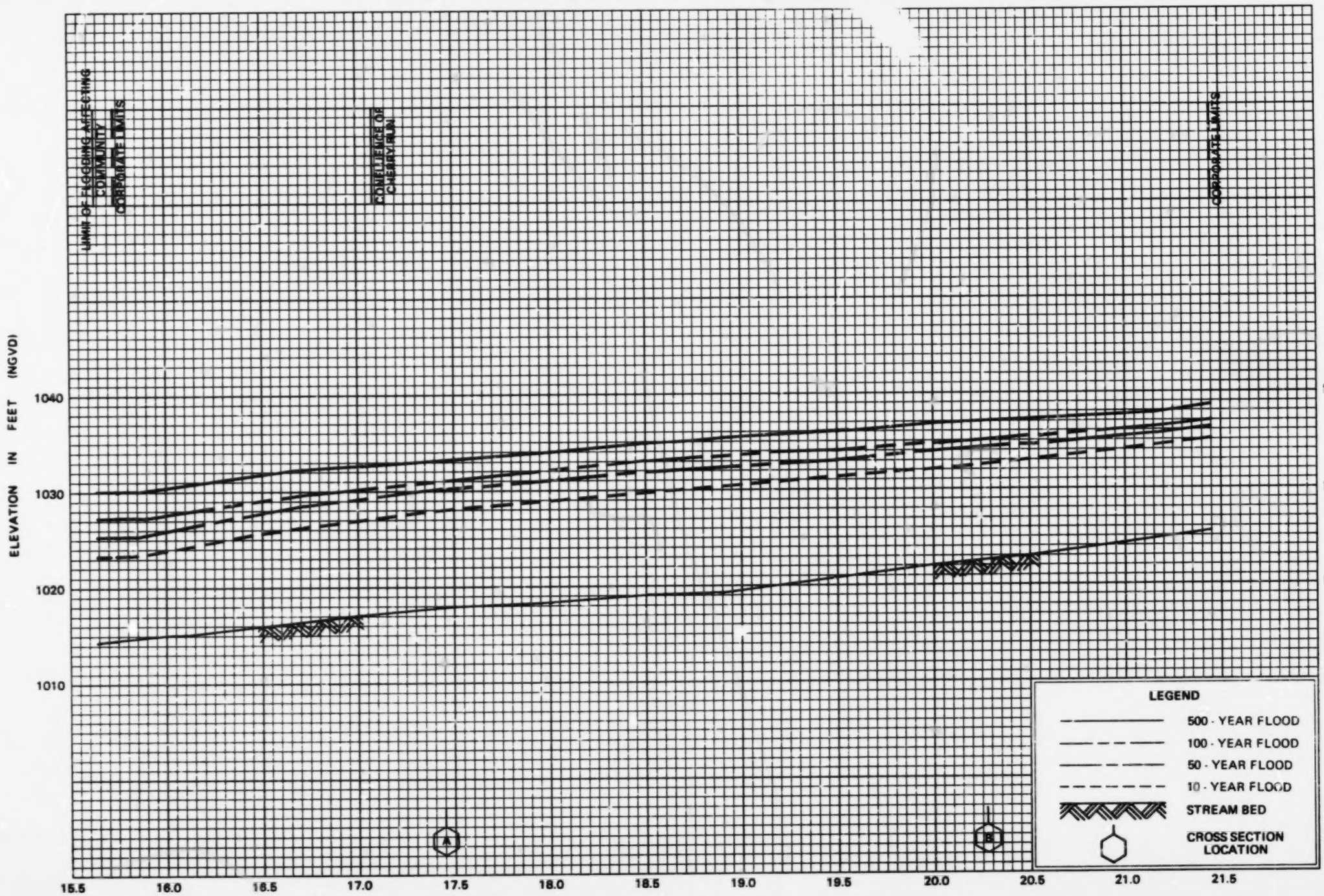

FLOOD PROFILES

OIL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF ROUSEVILLE, PA
(VENANGO CO.)

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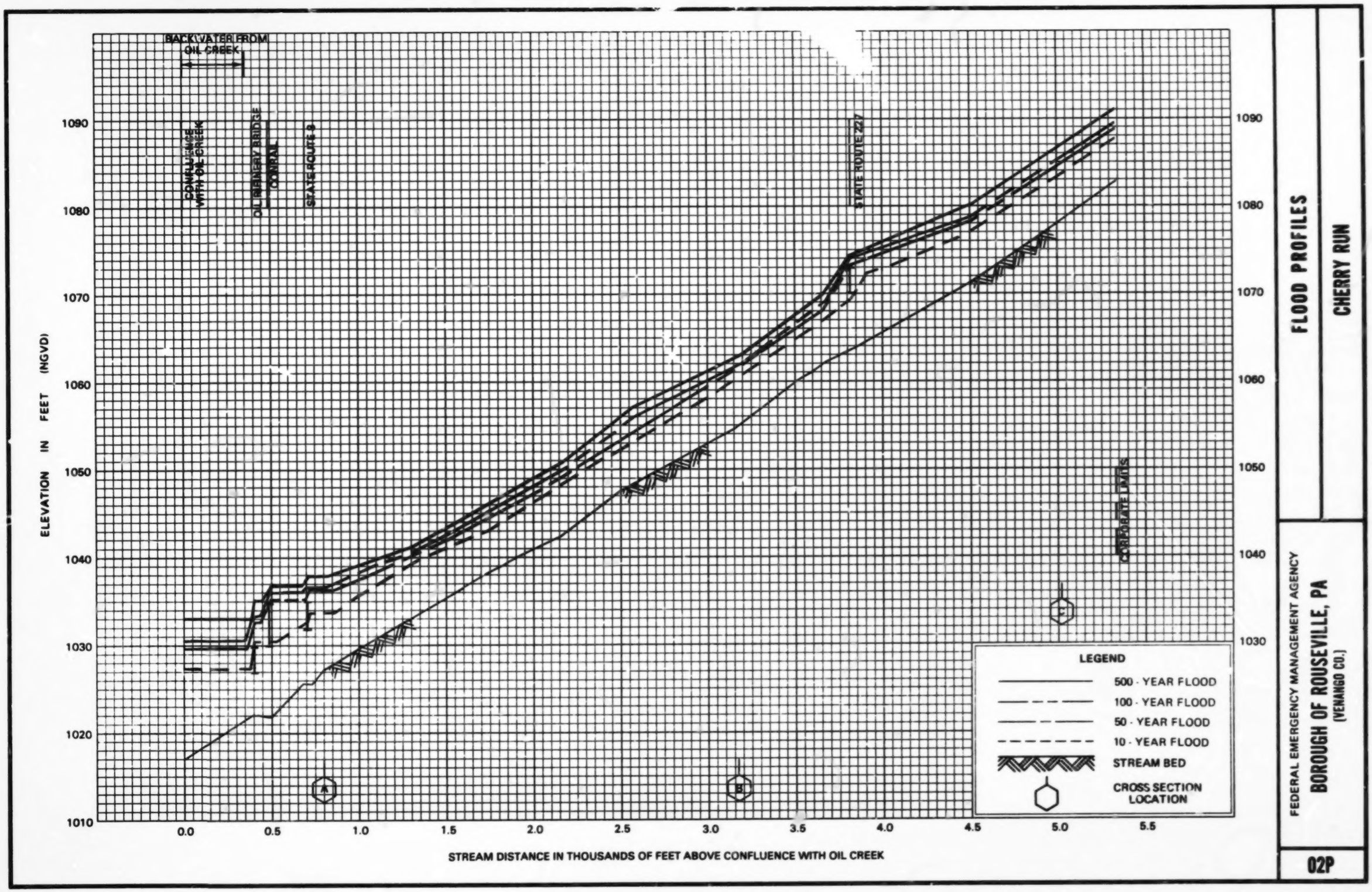

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